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## " Sustainable Mobility according to Europe: implications in a globalized marketplace "


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# Introduction

The ecological crisis represents one of the greatest of the problems that contemporary society is called upon to solve. The well-being of current and future generations is hostage to the impact of the dynamics that all political, economic and social activities have brought about to date, complex, articulated and interdependent dynamics that together with the gravity of the situation make temporary or marginal measures unnecessary. Europe, building on the foundations laid in Paris in 2015, has therefore recently taken an important decision, setting an ambitious goal. Following a protracted rumour, in March 2023 the majority of European ministers ratified the regulation on the stopping of petrol- and diesel-powered internal combustion engines, scheduled for 2035. Three countries abstained, including Italy, and only Poland voted against. This measure gives food for thought about the market in question, a highly globalised market in which the pursuit of such a goal has the potential to set off a domino effect of changes that will undoubtedly shake things up, but who will be disadvantaged? Who, instead, will benefit? And is it possible that Europe itself will fall victim to its own initiative? The latter is a case study not to be ruled out, which it will be interesting to explore further in this thesis project through the analysis of the industry and international relations (current and future entailed by the 2035 measure), the leadership in the field of battery production, the control of supply channels for the materials needed for their production, and the development of disposal facilities.

The paper therefore aims to analyse the European Parliament's choice of stopping the production of fossil combustion cars by 2035 from an economic point of view, considering international relations and the implications and risks inherent in this goal.

The discussion will consist of four (three?) chapters. The first of these is intended to set out the issue that governments are currently undertaking to address, exposing severity and related causes, and in particular the implication of the automotive sector. The second chapter will provide a clear overview of the parliamentary

forecasts in question, including the context and basis for ratification. Among the positions taken in parliament by the various countries, more detail will be devoted to our country, Italy, and Germany, which is of particular influence and relevance. Conclusions and considerations dealt with in the last chapter regarding possible future scenarios to which existing approaches may lead will be based on the introspection, conducted in the third chapter, into the industry under scrutiny.

# Chapter 1: Sustainable mobility

## Ecological crisis and sustainability

Sustainability is one of the most recurring words of the 21st century. It is talked about in schools, in the news and more generally on television, discussed by diplomats and claimed in commercials by large corporations, as well as in any common conversation on current affairs. We are constantly being made aware of this issue and each of us would be ready to declare ourselves pro-environmental initiatives, but it is important at first to clarify the meaning of this term, which is often misunderstood by the public and over-generalised. Our vocabulary, in fact, does not help us to understand the true essence of this word. We are often influenced by a negative meaning of this term, which brings to mind something bearable, tolerable and not excessively expensive. If we consider the French language, which refers to this concept as 'durabilité', it becomes easier to fully understand the policies of governments, organisations and associations that promote the pursuit of the sustainable development goals we all claim to fully support. We also think of the pedal that pianists use to prolong the resonance of a note, which goes by the name of 'sustain'. We come closer to understanding what this now fashionable term refers to: something that is durable, that is able to last. The aim in promoting sustainable nature initiatives is thus to be able to pursue goals and meet today's needs while acting in a way that does not worsen environmental conditions, and thus does not condemn future generations to far more arduous battles against problems that are substantially more serious and complicated than those of today.

## Sustainable Development

One of the most quoted definitions dates back to 1987, when the World

Commission on Environment and Development (UNCED) published the Bruntland Report, in honour of Gro Harlem Bruntland, the then Prime Minister of Norway. Also known as 'Our Common Future', it mentions: *'development that meets the needs of the present without compromising the ability of future generations to meet their own needs*. The intention of UNCED, now almost 40 years ago, was to identify a new strategy that could reconcile the needs of socio-economic development with those of the environment, and it was to describe this new strategy that the term 'sustainable development' was coined. What is proposed is thus an approach that takes the form of an altruistic foresight nurtured from generation to generation, in response to the cry for help that our planet has long been crying out for. Human beings are thus called upon to revisit the linear patterns of consumption to which they have always been accustomed in order to embrace new, circular and therefore sustainable ones, distancing themselves from the almost total absence of behavioural ethics in industries, and more generally in everyday life, which have long since become normalised.

The Bruntland Report set the tone for environmental concerns and became a key reference point for international policy debates and initiatives related to sustainability. It was an important basis for subsequent climate and ecological agreements, including the 2030 Agenda, adopted by the United Nations in September 2015, which sets 17 'Sustainable Development Goals', global targets.

For development to be truly sustainable, there must be a balance between three interrelated and complementary dimensions, often referred to as 'the three Ps':

- Economic Sustainability (Profit):
  The first dimension concerns economic prosperity and value creation. It considers the efficient use of resources and the consequent minimisation of waste and environmental impact, the promotion of inclusive and non-harmful economic growth, and the ability to secure income and jobs to sustain the population.
- Social Sustainability (People):

The second dimension puts the focus on the well-being of society and individuals as a whole. It therefore gives weight to equality, education, health and inclusion, but also democracy, security and justice.

- Environmental Sustainability (Planet):
  Last, but not least, of the three dimensions focuses on the conservation and responsible management of natural resources and the environment. Essential in these terms is the ability to preserve the quality, reproducibility and availability of resources.

Balancing economic prosperity, social welfare and environmental conservation is a fundamental challenge for contemporary societies, but it is essential to ensure a sustainable future for present and future generations.

## Sustainable mobility

In the context of sustainable development, an essential role is played by sustainable mobility. The transport sector is crucial for the global economy, as of course is the mobility of people. At the same time, however, it is one of the most damaging sectors for our planet. Consequently, it is regarded as a central theme in the context of innovation for the green transition. Road transport, particularly that based on fossil fuels such as petrol and diesel, is a major source of air pollution. Harmful gases emitted by vehicles, such as nitrogen dioxide (NO2) and fine particles (PM2.5), significantly damage our health and contribute to climate change. Significant proportions of greenhouse gas emissions are attributable to the use of fossil fuels, which exacerbate global warming by causing potentially catastrophic consequences such as rising seas, extreme weather events and changes in climate patterns. Perishing from the problems caused by the frenetic use of means of transport for vehicles and passengers is not only the planet, but also each of its inhabitants. The resulting air pollution can cause a range of health problems, including respiratory and cardiac diseases and even premature mortality, as well as the psychological stress caused by road congestion in large cities. Among the damage for which the

transport sector is responsible are also road accidents, which, although in no way influencing the issue at hand, are a dramatic reality, a tragedy too significant not to be mentioned in the transport field.

With the exception of road accidents, the common cause of the effects the transport sector has on our planet is very clear: dependence on fossil fuels, i.e. on non-renewable sources.

Sustainable mobility is an approach to transport that aims to minimise environmental impact while improving public health and quality of life. In order to mitigate the implications listed above, various methods can be efficient, such as the implementation of public transport such as buses, trains and trams, which can transport a large number of people at one time, thus focusing on numbers and decreasing the number of moving vehicles. Such a result is achievable through a reduction in travel, achieved through teleworking, communication technologies and the organisation of local activities. Assuming that social awareness and individual commitment were so developed as to allow the scenarios described to actually be realised, the result would be a mere mitigation of the problem, of little use as a solution to a crisis that is now well underway, where total resolution, and not just mitigation, is already more than urgent. Just think of *'Earth Overshoot* Day*', the* day on which, year after year, our planet's resources run out and since when we have been in 'ecological debt'. (28/07 in 2022, 02/08 in 2023)[1]

## Development and research in the automotive sector

The solution that has the potential to overcome the critical issues we face is low- and, at best, zero-emission means of transport.

The automotive sector has responded to the need for a 'green' solution in an abrupt manner with several proposals for possible alternatives to fossil fuels, which have led to various trends and development and research activities. Among the most

[1] https://www.overshootday.org/

promising zero-emission solutions are battery-powered electric cars and hydrogen-powered combustion cell engines. It is important to emphasise, as discussed in more detail in the following sections, that the emissions associated with electricity or hydrogen production can have a significant impact on a vehicle's overall emissions profile.

## Hydrogen

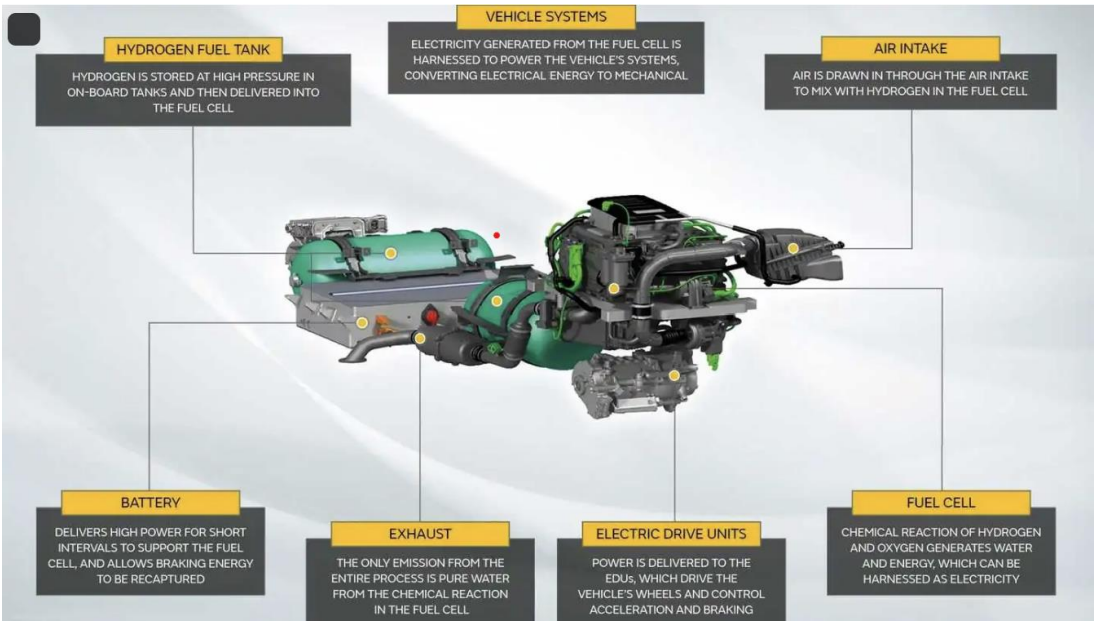
The momentum behind hydrogen is very strong, since last year the low-emission hydrogen production grew by 9% and the production capacity of the energizers has doubled, as have also doubled the expectations for 2030. In addition to the role it could play in automotive, clean Hydrogen could also help to decarbonise a range of sectors, to improve air quality in many cities and to improve energy security as well. It can also support the integration of variable renewables, thanks to its electricity storage capacity.

At the forefront of renewable and low-emission hydrogen development there is Northwest Europe, which accounts for around half of Europe's total hydrogen demand. Demand for renewable hydrogen, which is an uncertain forecast, will determine the pace of expansion of dedicated renewable capacity. While many provinces include hydrogen in their industrial development strategies and identify production targets, not all of them specify that production must come from renewable sources. Furthermore, demand-side policies are independent of emissions and therefore do not guarantee the creation of new specific demand for renewable hydrogen, especially if it costs more than hydrogen produced from non-renewable resources. For renewable hydrogen exporters, securing buyers to finance planned projects is a major expected uncertainty, but importing countries' policies to stimulate demand can help address this challenge.

Restricting the field under consideration to manufacturers in the automotive industry, the development of this means of power has always remained confined to a narrow niche. However, there have been several cases of fuel-cell prototypes that

have actually covered kilometres on the roads. Expectations and interest in the development of hydrogen-powered cars has clearly come to a standstill as electric mobility has continued to evolve, to the point where it has become the main focus of the major manufacturers' strategies to the detriment of, among others, hydrogen. However, despite the fact that many have abandoned the development of this technology, such as Ford, General Motors, Mazda and Mitsubishi, there are still projects underway, as well as some car concluses currently on the market (Citroen e-Jumpy, Pegeout e-Expert, Opel Vivaro-e, Toyota Mirai, Hyundai Nexo, Hyundai ix35).

Figure 2




Despite the promising conditions, hydrogen is a versatile energy vector whose high potential for solving environmental problems is limited by its current origin mainly attributable to fossil fuels, which leads to high CO2 emissions. Hydrogen is mainly used in the refining and chemical sectors, and its production today is primarily based on fossil fuel technologies, with over a sixth of the global hydrogen supply coming from "by-product" hydrogen, mainly from facilities and processes in the petrochemical industry (low-emission production represented less than 1% of total hydrogen production over the last three years).

## Electric motors with batteries

Electricity, of chemical origin, is not generated, but rather transformed from other forms of energy, which can be divided into two macro-categories: renewable energies, such as geothermal, wind, solar, hydroelectric and nuclear energy, and non-renewable energies, mainly hydrocarbons and fossil fuels. Each of the sources and technologies through which electricity is produced has its own specific process. The main methods of electricity production include: coal, natural gas, hydro, wind and solar power plants, biomass power plants, geothermal technologies, nuclear power plants and others.

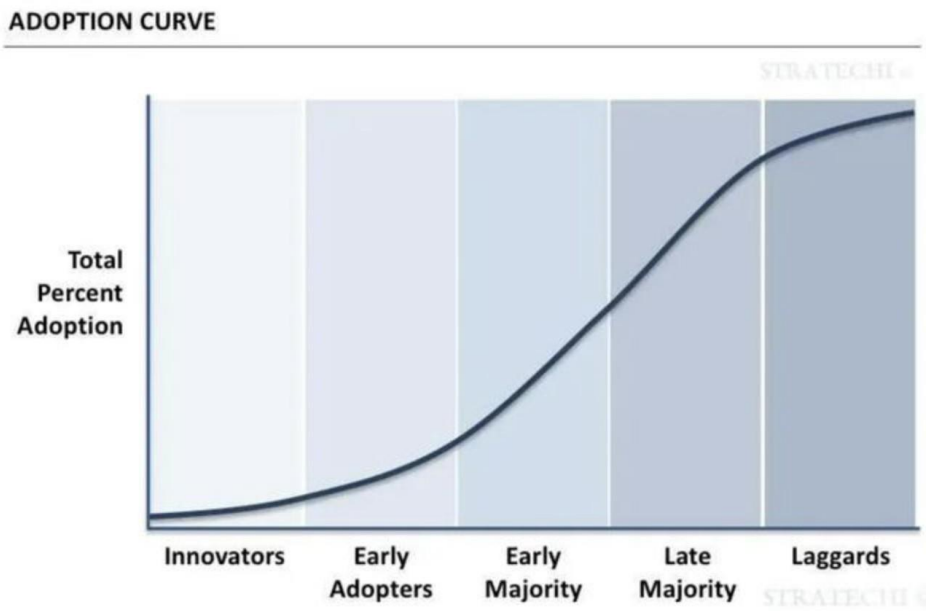
Electric cars use a combination of electric motors and lithium batteries, which have been a turning point in the development of these vehicles. This type of battery, the beating heart of this power scheme, uses a pack of cells to store energy and uses a chemical reaction to release it in the form of electricity. The electricity supplied to the battery from the charging station is alternating current (AC). Therefore, since the batteries and motor require direct current (DC), an inverter is used to convert AC to DC. Once stored by the batteries, while driving the electrical energy is distributed from the battery (or batteries) to the electric motor (sometimes more than one), which converts it into mechanical movement that, transferred to the wheels, allows the vehicle to move.
Most electric cars also have a system that allows them to recover energy during deceleration and braking, when the car's kinetic energy is converted back into electricity and stored in the battery, rather than being dissipated as heat.

When it comes to motoring, one knows that vehicle performance plays an important role in the success or otherwise of one model over another in the market. Unlike other environmentally friendly alternatives for mobility, the case of electric power does not force those who like efficient, high-performance vehicles to give up on it. Electric cars, in fact, despite the shortcoming of autonomy, which is being resolved as developments in the field progress, allow the driver to make use of the total horsepower, and thus the power generated by the engine, instantaneously,

unlike internal combustion engines, which during acceleration follow a process of increasing energy delivery given the specific functioning of this type of engine. This results in a lower top speed on average compared to petrol- or diesel-powered vehicles, but a much higher efficiency in sprinting and acceleration, due precisely to the immediate availability of all the power the engine is capable of generating.

The electric car industry is constantly evolving and more than representing the future of the automotive industry, it represents its present. The threshold of adoption of a new technology after which the novelty quickly accelerates to mass adoption seems to have already been crossed by several countries in electric car sales. Decades of research have led to the conclusion that the adoption of new technologies follows an S-shaped curve: sales move very slowly in the market introduction phase, then accelerate rapidly until they become mainstream. At this point, there is usually a new slowdown due to near market saturation.

Figure 3



According to Bloomberg Green, this threshold, estimated at 5%, was reached in 2022 by 19 countries, a number that is set to grow by the end of 2023, with Canada, Australia,Spain, Thailand and Hungary also joining the top 19 so far. We will, however, dwell on the nuemers and characteristics of this market later in the chapter.

Figure 4

| Country | EV sales in Q2 2023 | Latest EV market share | First quarter at 5% |
|---|---|---|---|
| Norway | 31,091 | 82.1% | 2013 Q3 |
| Iceland | 2,634 | 38.9 | 2017 Q3 |
| Sweden | 29,858 | 38.6 | 2021 Q2 |
| Finland | 8,688 | 33.5 | 2020 Q4 |
| Denmark | 14,207 | 32.0 | 2020 Q3 |
| Netherlands | 33,158 | 31.8 | 2018 Q4 |
| Ireland | 5,004 | 25.7 | 2019 Q4 |
| Switzerland | 12,917 | 19.9 | 2020 Q1 |
| Austria | 12,563 | 19.7 | 2018 Q3 |
| **Germany** | **127,823** | **17.5** | **2020 Q3** |
| Belgium | 23,168 | 17.4 | 2020 Q4 |
| UK | 78,194 | 17.2 | 2020 Q2 |
| **China** | **1,206,316** | **16.8** | **2018 Q4** |
| France | 75,914 | 16.2 | 2020 Q1 |
| Portugal | 9,278 | 16.0 | 2020 Q1 |
| Australia | 25,682 | 11.3 | 2022 Q3 |
| New Zealand | 4,637 | 9.8 | 2021 Q3 |
| Thailand | 15,316 | 8.1 | 2023 Q1 |
| **US** | **285,360** | **7.0** | **2021 Q4** |
| Spain | 16,907 | 6.3 | 2022 Q1 |
| Canada | 27,608 | 5.9 | 2022 Q1 |
| Korea | 27,353 | 5.0 | 2021 Q2 |
| Hungary | 1,227 | 4.6 | 2021 Q4 |
| **Global Total** | **2,197,877** | **11.6** | **2021 Q2** |

Sources: BloombergNEF, BI, ACEA, CATARC, OFV, Experian, New Zealand Ministry of Transport
Note: Hungary's market share declined in Q2 after reaching 6.2% the prior quarter.

# Chapter 2: Sustainable mobility and European legislation

## The European Union towards sustainability

Since the second half of the last century, a process of awareness of environmental issues has been underway in the international community, at first through the observation of changes and patterns in the climate and earth's functioning and, later, in the reinterpretation of human activity with respect to its impact on the balance of our planet, which is essential to be able to then promote sustainable development activities on a global scale.

Faced with the environmental crisis, the European Union has always been at the forefront, defining objectives, policies and action programmes to protect the environment. In 1992, the foundations were laid for the creation of the European Union with the TEU, also known as the Maastricht Treaty, which came into force on 1 November 1993. Although the Treaty was not specifically designed to address environmental sustainability, it has since had significant implications for sustainability in Europe, paving the way for a series of dedicated policies and actions. The TEU included the environment among the areas of shared competence between the EU and member states, so that common environmental laws could be developed, declaring a commitment to safeguarding sustainable development. According to the article, the Union '*shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment*'[2]

Less than 10 years later, a further step towards sustainability. In 2001, the Gothenburg European Council presented the first National *Sustainable Development Strategy. The* latter, which was not approved at first and was later integrated into

[2] Article 3(3) TEU

the Lisbon Strategy in 2000, is regarded as the starting point of the process that later led to the goals set by the 2030 Agenda for Sustainable Development[3] .

A crucial date for Sustainable Development is 25 September 2015. On this day, at the UN General Assembly, the 193 member countries signed the Agendas 2030, a broad and ambitious agenda promoting peace, justice and effective institutions. Underpinning the Agenda are the 17 goals (Sustainable Development Goals, SDGs) set, totalling 169 targets. These goals cover a wide range of highly relevant issues, such as the promotion of health, access to quality education, gender equality, the promotion of peace and justice and, among others, also the protection of the environment. It therefore aims at a globally agreed interdisciplinary approach to the three pillars of sustainable development discussed in the first chapter.

Next, the 17 Sustainable Development Goals:

1. Ending all forms of poverty in the world
2. End hunger, achieve food security, improve nutrition and promote sustainable agriculture
3. Ensuring health and well-being for all and for all ages
4. Providing quality, equitable and inclusive education and learning opportunities for all
5. Achieving gender equality and empowering all women and girls
6. Ensuring the availability and sustainable management of water and sanitation for all
7. Ensuring access to affordable, reliable, sustainable and modern energy systems for all
8. Promoting lasting, inclusive and sustainable economic growth, full and productive employment and decent work for all
9. Building resilient infrastructure and promoting innovation and fair, responsible and sustainable industrialisation
10. Reducing inequality within and between nations
11. Making the city and human settlements inclusive, safe durable and sustainable

[3] https://www.mase.gov.it/pagina/la-strategia-nazionale-lo-sviluppo-sostenibile

12. Ensuring sustainable patterns of production and consumption
13. Promoting actions, at all levels, to combat climate change
14. Conservation and sustainable use of the oceans, seas and marine resources for sustainable development
15. Protect, restore and promote sustainable use of the Earth's ecosystem
16. Promoting peaceful and inclusive societies for sustainable development
17. Strengthen the means of implementation and renew the global partnership for sustainable development.[4]


Evaluation of progress will have to be carried out regularly, by each country, involving governments, civil society, businesses and representatives of various interest groups. A set of global indicators will be used, the results of which will be compiled in annual reports.

A key role is played by the European Union. Areas in which the EU is committed to promoting sustainability include the financial sector. In 2018, the European Commission adopted an Action Plan on Sustainable Finance, which aims to integrate

[4] Agenda 2030

environmental, social and governance factors into investment decisions and business practices. This plan provides guidance to encourage sustainable investments and promote a shift towards a low-carbon economy.[5]

## The foundations: from the Kyoto Protocol to the Paris Agreement

Let us take a step back and understand what dynamics have led to today's arrangements used to combat the climate crisis. The first international agreement containing commitments by industrialised countries to limit emissions of certain greenhouse gases was the Kyoto Protocol[6] . The treaty was adopted in Japan, in the city of Kyoto, on 11 December 1997, and officially entered into force on 16 February 2005. The planned constraints, which only applied to 37 industrialised countries, were drafted taking into account the CBDR (Common but Differentiated Responsibility) approach, consolidated under the UNFCCC (United Nations Framework Convention on Climate Change), also known as the Rio Accords (1992), according to which:

> *"In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities".* [7]

The main aspect of the Kyoto Protocol commitments is that they are binding and quantified, making the measure concrete and effective.

The greenhouse gases whose harmfulness is being attempted to be limited are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), hyperfluorocarbons (PFCs) and sulphur hexafluoride (SF6). To this end, the Protocol requires countries to achieve their respective targets mainly through national measures, but not excluding market-based '*Flexible Mechanisms*'. These include:

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[5] https://www.assifact.it/fact-news/stato-dellagenda-2030-e-ruolo-delle-imprese/

[6] Kyoto Protocol: unabridged at: https://www.mase.gov.it/sites/default/files/archivio/allegati/vari/Documentazione_-_Il_Protocollo_di_Kyoto_della_Convenzione_sui_Cambiamenti_Climatici.pdf

[7] Principle 7 of the Rio Declaration at the first Rio Earth Summit in 1992

- International Emission Trading (ET): provides that in the event that a country has over-performed, it can give 'credits' to a country in the opposite circumstance.
- Clean Development Mechanism (CDM): allows industrialised countries and countries with economies in transition to generate emission credits (CERs) by promoting projects in developing countries that produce environmental and social benefits there.
- Joint Implementation (JI): allows industrialised countries and countries with economies in transition to implement projects aimed at reducing greenhouse gas emissions in another country of the same group and to use the resulting credits jointly with the host country[8]

In spite of the EU's commitment to it, already in the early days of the project, the morale of those involved was not high, the obstacles and weaknesses of the protocol were evident. The excessive rigidity of the proposed approach was not in line with the technical and political difficulty of the issues addressed, possible contributions from other countries were not evaluated and, in any case, even the best-case scenario in terms of results would not have achieved the Convention's goal of stabilising climate change. It had to start somewhere, but the numbers speak for themselves. The countries concerned did not reach 50 per cent of global emissions, a figure that was aggravated by the position taken by the United States afterwards, given its failure to ratify the Protocol and the fact that it shirked its agreed obligations, which brought the share of accessions to 14 per cent of global emissions (it should be noted, by the way, that the obligations in question were far less intrusive than those for the European Union). The
actual failure of the Protocol became official at the end of the commitment period, in 2012, when emissions had risen sharply.

Following the Kyoto Protocol, the crucial points are clear, the involvement of the US, China and India is indispensable. To this end, it was necessary to bring the principle

[8] ISPRA, Institute for Environmental Protection and Research https://www.isprambiente.gov.it/it/servizi/registro-italiano-emission-trading/contesto/protocollo-di-kyoto

of CBDR back to the meaning envisaged in the Framework Convention[9] , thus reintroducing the common responsibility of all states and departing from the new interpretation of the *Berlin Mandate.* The Framework Convention establishes the principle of CBDR as a general recognition of the common responsibility of all countries to tackle climate change, but at the same time recognises that nations should address these challenges according to their respective possibilities and levels of development. The Berlin Mandate, on the other hand, interprets the CBDR in a more differentiated way, recognising that developing countries should have taken less onerous responsibilities than industrialised countries in reducing greenhouse gas emissions and thus addressing climate change. The reason for the US abandoning its targets can be identified, in fact, in the fact that India and China were indeed considered as developing countries, but were included in a category that had little to do with them in terms of economy, growth prospects and the development process itself. This change, though necessary, is not easy to achieve due to the rejection by China and India of any changes to the Berlin Mandate.

The situation described above led to the Bali Action Plan in 2007, concluding COP-13. The plan distinguishes the subsequent negotiations into two distinct tracks, with different contents, to satisfy both developed and developing countries.

With these assumptions, expectations of a binding successor agreement to the Kyoto Protocol were dashed at COP-15 in Copenhagen in 2009. The negotiations ended with a political agreement called the 'Copenhagen Accord', which had no legal value and was not officially adopted by the COP. It was initially considered a failure, but in retrospect this agreement laid the foundation for the Paris Agreement. The Copenhagen Accord focused on three key points:

- All Parties agreed to follow scientific data, including that of the IPCC, but could not agree on a common limit for global temperature increase. Instead, they agreed to make 'deep reductions' in greenhouse gas emissions by 2050.

[9] The aforementioned United Nations Framework Convention on Climate Change (UNFCCC), one of three multilateral environmental conventions adopted at the 1992 Rio de Janeiro Conference, was the first global response to the challenge of climate change.

- The debate on financing by rich countries to support emission reduction projects in developing countries has opened up, with the aim of ensuring shared rules and defined timeframes. This issue has caused conflicts due to a lack of mutual trust between donors and recipients of funding.
- The economically emerging countries participated in the negotiations as a separate group, pledging to submit voluntary plans for climate change mitigation and submit them for verification by independent bodies. This marked a break with the previous 'Berlin Mandate' and the Kyoto Protocol.

These provisions mark the beginning of the dissolution of the barrier previously established by the 'Berlin Mandate'. The economically emerging countries agreed to take measures to tackle the climate crisis, thus calling into question the unity of the developing countries, which until now had been independent of the varying degree of economic development achieved by other countries. Finally, the concept of a binding convention for all, on which the Kyoto Protocol was based, was abandoned, and instead the development of a new approach based on the participation and cooperation of individual states to achieve a common goal began. This new approach will later be used in the Paris Agreement. Although the Copenhagen political agreement was signed by only a few countries, which was seen as a clear sign of the conference's failure, a 2011 UNEP report found that in the aftermath of the conference as many as 140 countries signed up, submitting their emission reduction plans, including 42 industrialised countries such as the United States, and in particular 43 states belonging to the group of developing countries, including China, India and Brazil, voluntarily submitted their plans to reduce emissions by 2020.

However, by 2020, emissions in the plans presented in the Copenhagen Accord would have exceeded the temperature increase limit by 2 degrees Celsius compared to the pre-industrial era, necessitating more ambitious targets. In 2011, during the COP-16 in Cancun, the Copenhagen 'political' commitments were formally included in the COP's final decision. This involved all major world economies and greenhouse gas emitters. The breaking point with the Kyoto Protocol approach is now behind us, and in order to achieve the goal of limiting the temperature increase to less than 2

degrees, a system of monitoring and verification of the commitments voluntarily undertaken by states on the basis of international consultations and analyses conducted by a commission of experts was envisaged. Those just described are the issues we will find at the heart of the Paris Agreement.
At the same time, non-negligible weight is given to adaptation processes[10] .

*"adaptation must become a parallel strategy to mitigation efforts as risks from climate change could increase substantially if it is not implemented".*[11]

Finally, in order to mitigate suspicions about funding commitments to support developing countries, the 'Green Climate Fund' was established to manage and distribute the funding provided by industrialised countries for adaptation.

A second and final preparatory step to the Paris Agreement is the Durban Platform, dated December 2011, adopted in South Africa at the end of COP-17[12] . The main objective was to manage the negotiations necessary to prepare by 2015, with validity starting in 2020, "a treaty, another negotiating instrument or an agreed outcome with legal force between the parties"[13] , the result of the compromise reached to reconcile the demands of the European Union for a binding agreement with the strong resistance of India and the willingness shown by China, on the condition that the agreement would enter into force before 2020. This time we are faced with the official override of the Kyoto Protocol and the Berlin Mandate's interpretation of the CBDR.
The Durban Platform commits all states of the international community to proceed jointly in the negotiation of a global agreement that, although non-binding, must nevertheless be legally effective in 2020, a commitment made official one year later at COP-2012 in Quatar, through the drafting of a timetable for the adoption of a universal climate agreement by 2015 at COP-14 in Lima, where the Parties

[10] Adaptation to climate change concerns changes to be made in response to current or foreseeable climate change and its effects, so as to mitigate damage or take advantage of beneficial opportunities.
[11] IPCC, Climate Change 2007: Impacts, Adaptation, And Vulnerability: Contribution Of Working Group II To The Fourth Assessment Report Of The IPCC, 2007, 6.
[12] On the Durban Platform: D.BODANSKY, The Negotiations: Goals and Options in Harvard Project on Climate Agreements Viewpoint, 2012

committed to present their plans for the 2015 Agreement.

The road to the Paris Agreement is paved, but between now and the conclusion of the negotiations two events will mainly affect it:

- the publication of a summary document of the IPCC's Fifth Report, which consists of an exposition of the scientific foundations of global warming, the damage it causes and the measures that could provide a solution. It warns that a prerequisite for limiting the temperature increase to 2°C by the end of the century compared to the pre-industrial period is the achievement of a minimum 50% share of energy produced from sources with low emissions of air pollutants and, by the end of the century, the complete avoidance of fossil fuels.
- The second major influencing factor is the intensification in 2015 of legal action against governments for human rights violations committed by failing to contain the risks and dangers of climate change.

This finally brings us to COP-21 in Paris. Expectations in this regard are very high, witness the presence of 15 heads of state, over 20000 representatives of the 195 participating governments and 9000 observers, not to mention countless journalists. After two weeks of work, two documents are published: the 'Paris COP decision' and the 'Paris agreement', the union of which is called the 'Paris Outcome'. The latter is a fairly complex document, separated in its dual purpose and the separate legal effectiveness of its two component documents. Only the Agreement is a binding act and regulates the regime to be implemented after 2020, covering a variety of topics. The COP Decision, on the other hand, is non-binding and also deals with various topics in 6 chapters and as many as 140 articles, concerning the initiatives to be implemented by the various states before 2020 to prepare for the entry into force of the Agreement and to fuel the ambition of the projects. This second document also introduces THE "Ad Hok Working Group on the Paris Agreement" to assist states in their preparation.

The purposes are multiple. The first purpose concerns change mitigation processes. The parties have to comply with the indications already formulated by the Durban Platform, as the goal is made even bolder: in addition to the already known 2°C target, the goal of keeping the increase 'far' below 2°C above the pre-industrial level and doing everything possible to contain it to 1.5° is also mentioned. A second goal

addressed by the agreement concerns adaptation processes, a more than indispensable aim if the inevitable effects of climate change are to be limited. The third and final aim is to organise investments and financial flows in such a way as to favour development based on reduced greenhouse gas emissions. This is the most innovative of the three aims, attempting a new approach to the topics that had hitherto constituted the greatest friction between countries, namely the use of financial instruments and the use of fossil fuels.[14]

**Stop petrol and diesel engines in 2035**

A courageous choice, no doubt about it, that of the European Union, which continues its battle against the ecological crisis by setting a target, a date that would mark a turning point, a step that would take it very far in the process of sustainable development.

The final approval by the European Parliament on the obligations to reduce CO2 emissions marks a stop to the sale of new cars and light commercial vehicles with combustion engines on EU territory from 1 January 2035. This provision will permanently revolutionise private mobility, cities and the economy far beyond the boundaries of the automotive sector alone. This decision was taken in the context of the 'Fit for 55'[15] , a package of measures proposed by the European Commission on 14 July 2021 as part of the European Green Deal. This package aims to reduce the Union's greenhouse gas emissions by 55 per cent by 2030 compared to 1990 levels, in an attempt then to move ever closer to the goal of climate neutrality by 2050. In an attempt to achieve the goals set out in the Paris Agreement, the Fit For 55 package includes a series of legislative proposals and initiatives covering a wide range of economic policy areas. These include the obligation to reduce emissions in transport, in which context we introduce a stop to the production of petrol and diesel engines.

[14] Stefano Nespor: “The long march to a global climate agreement: from the Kyoto Protocol to the Paris Agreement”
[15] https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

## The positions of the different countries in parliament and e-fuels

In parliament, Italy abstained, according to the final record of the vote, the same approach as Bulgaria and Romania. The only country to come out against was Poland. The latter, according to a report in 'Automotive News Europe', has decided to contest the 2035 directive with every means at its disposal. The Minister for the Environment, Anna Moskwa, has expressed her intention to appeal to the European Court of Justice, holding firm to the Polish government's position that there is no adequate analysis of the social and industrial repercussions of the measure, in the hope of receiving support from other European countries.

Germany is the main object of Polish objections. Anna Moskwa expressed the opinion that '*non-transparent and informal discussions in which Germany pushes for solutions that mainly benefit its market -demonstrate that this has nothing to do with a fair transaction*'. The reference in question concerns the agreement between the EU and Germany, which played a key role in the troubled path to ratification on 28 March. The subject of the agreement is so-called 'e-fuels', a particular category of liquid or gaseous fuels produced through a series of chemical processes, known as gas synthesis or Fischer-Tropsch synthesis, which involve the use of electricity produced from renewable sources to convert carbon dioxide (CO2) and hydrogen (H2) into a usable fuel, such as ethanol methanol or synthetic diesel. This type of fuel could then allow conventional engines to continue to be used in the future, reducing pollutant emissions. Germany asked for the possibility to be included in the regulation that the 2035 deadline be postponed if e-fuel technology, which is still fairly primitive today, had evolved over the next ten years. At
the end of the negotiations, it was concluded that the European Commission would propose a delegated act in autumn 2023 specifying how vehicles powered exclusively by synthetic fuels could contribute to CO2 emission reduction targets. Germany's resistance to the e-fuel exception was in line with Italy's position. Noting

Brussels' commitment to present proposals for legislation on the use of e-fuels, Environment Minister Gilberto Picchetto, believing that the category considered in the agreement between Germany and the Union was too restrictive, said that 'Italy has asked for a more in-depth discussion among the Member States to make it more effective, including all available solutions. Believing that the inclusion of synthetic fuels does not allow for a full implementation of the principle of technological neutrality for which Italy has fought, the minister added: "We are convinced that biofuels can also be included in the category of neutral fuels in terms of overall CO2 balance and contribute to the progressive decarbonisation of the sector".

Italy's intention is clear and in line, logically, with the characteristics of the Italian industrial and automotive sector, to do everything possible to continue to use fuels that are synthetic like e-fuels and also have the characteristic of balancing emissions.[16]

# Chapter 3: The International Context of Transition

## Sustainable mobility in the rest of the world

The leading nations in the transition process to the electric car are China, Sweden and Germany, then the UK, South Korea and the US, which aspire to leadership positions, followed by Japan, Canada and Italy. The EY Electric Vehicle Country Readiness Indez shows how the decarbonisation process in the transport sector will be a key lever in the fight against climate change. The data[17] shows that around the world 41% of consumers who intend to buy a vehicle would prefer an electric one, and 77% of those who have already had the experience of buying an electric vehicle would repeat it. Consumers are increasingly focused on the sustainability of their

[16] Ansa Europa: https://www.ansa.it/europa/notizie/rubriche/altrenews/2023/03/28/ratificato-lo-stop-ai-motori-termici-nel-2035_085a7715-4f6e-4463-a7e9-473a498d047c.html

[17] Paolo Lobetti Bedoni, EY Consulting Market Leader in Italy

journeys, and according to predictions in Ey's new Electric Mobility Report, by 2033 sales of electric vehicles in China, Europe and the United States will surpass those of all other powertrains.
More generally, according to McKinsey, in 2035 we will see a significant drop in car sales in general: by around 20% in Europe and around 30% in the US compared to 2015. Offsetting this decline will be the use of public transport, together with new shared mobility options such as bike or car sharing services or robo-shuttles.

In the United States, the race to dominate the global electric vehicle market is already underway, a double funding stream has been announced with the aim of converting the domestic automotive industry to the production of hybrid and electric vehicles. The Biden administration will allocate up to 12 billion: 10 billion will come from the Department of Energy's (DoE) loan programme office and another 2 billion will come from Inflation Reduction Act grants. The DoE will also make an additional $3.5 billion available for domestic battery production, thanks to the bipartisan infrastructure bill. Both of these grants will prioritise companies that provide good working conditions, pay high wages, and promote efforts to maintain or expand collective bargaining agreements. Two factors are mainly driving American e-mobility: firstly, the purchase incentives of up to $7,500 introduced with the Inflation Reduction Act (Ira)[18] , and secondly, Tesla's price cuts on all models are also influential. It is no coincidence that Elon Musk's car manufacturer accounts for the majority of electric vehicles sold on US soil, even 57% of the battery market. The remaining part is occupied by players such as Chevrolet, Ford and Volkswagen, with the Hyundai-Kia duo less present. Tesla doesn't just claim the title of biggest seller in the US, it also comes out on top when its zero-emission competitors are premium brands like BMW, Audi and Mercedes-Benz.

## China leading the transition

[18] U.S. Department of Energy | Energy Efficiency & Renewable Energy: https://afdc.energy.gov/laws/electric-vehicles-for-tax-credit

China, as is well known, is one of the largest countries in the world and has an extremely large population. Consequently, it is a major emitter of greenhouse gases and pollutes the environment significantly, pollution that, however, varies regionally and sectorally within the country. Among the main sources of pollution are heavy industry, energy, agriculture and an important share occupied by transport. China, which has 16 of the most polluted cities in the world, is therefore trying to encourage the population to cooperate and thus reduce air pollution.

Over the past decade, electric mobility has been promoted here more than in any other country, with battery vehicles being included in the 'Made in China 2025' plan as one of seven strategic emerging sectors with the goal of achieving an 80% share of electric vehicles in total Chinese car sales and a 20% share of the total vehicle fleet, with the target set for near 2025. In an attempt to promote sustainable mobility, a comprehensive policy package has been developed, including business-oriented policies such as restrictions on new vehicle registrations and mandatory percentage targets for battery-powered vehicles; purchase subsidies for consumers; and government procurement together with government-funded research.
The result of this first approach is that in 2020 China had 44% of such vehicles, in the previous five years the number of electric cars sold grew from 0.3 to 4.5. Two years later, in 2022, the number of units sold in that year alone is 6.8 million. A comparison that allows you to perceive how important these numbers are, just think that in the same year, the United States did not reach the million mark.
The growth of Chinese power in this sector is staggering, and the figures prove it. Chinese companies, initially lagging behind their international competitors, have covered the gap very quickly, even surpassing them in the area of technologies necessary for sustainable mobility. Suffice it to say that before 2006, not a single Chinese company was among the top 20 patent applicants on a global scale, whereas only ten years later, half of the top 20 applicants are actually from China. This is a staggering growth, which has obviously gone hand in hand with the quality of the patents in question. Currently in the list of the world's top ten producers of electric cars, four are Chinese manufacturers.

- BYD (10.0% of world market share)
- BJEV (7.1% of world market share)

- SAIC (3.4% of world market share)
- Geely (3.4% of world market share)

It is important to note that this dominance is purely in the area of battery-powered vehicles, as an analysis of the traditional passenger car market shows that not a single one of the top ten manufacturers is Chinese.
A dominance that does not remain confined to private mobility. In 2019, China accounted for 99% of the world's electric buses.

A decade is the length of time it has taken since investment in batteries began to become a world leader. The speed with which China has been able to step in and succeed in doing so indicates that it will not be difficult for this major world power to gain dominance in other market sectors, particularly emerging ones such as autonomous driving and new mobility services.[19]

## Leadership in the battery market

A key point in this ecological transition are batteries[20] , thanks to which it is possible to decarbonise private mobility. The type of batteries referred to in the automotive sector, but also generally in most cases, are lithium batteries, consisting of an anode, a cathode and an electrolyte, which allow the flow of lithium ions during the charging and discharging process. This type of battery offers countless advantages. First of all, lithium is the third lightest element, preceded only by hydrogen and helium, thus making it possible to make low-weight batteries. Further benefits that can be derived from this type of battery include its versatility, its speed of response, which enables it to supply large amounts of energy within milliseconds, its slow discharge and its low self-discharge, i.e. its ability to hold a charge for a longer period without having to be recharged. The sore point, in no small part, for such a

[19] Bocconi: La rivoluzione elettrica dell'impero celeste 30/11/2022: https://www.viasarfatti25.unibocconi.it/notizia.php?idArt=24903&fbclid=IwAR1FQromFLs0f_iGGG2_C6PWZMTdDYHxvd3j5JJv3N2TV4vEjMvER_As1Rc
[20]Marco Dell'Aguzzo; "La cina vuole dominare le batterie alternative del futuro" 10/06/2023 https://www.wired.it/article/batterie-cina-sodio-litio/#:~:text=Il%20dominio%20della%20Cina%2C%20di%20nuovo,-C'%C3%A8%20poi&text=Pechino%20fabbrica%20il%2077%20per,cento%20di%20quella%20di%20nichel.

high-performance product is of course the price, which is generally quite a bit higher than that of other types of batteries.

The characteristics described highlight two main issues. Firstly, the fact that it is a product that perfectly meets the needs of the electric car market. In addition, given the crucial importance of batteries in the production of an electric vehicle and the influence they can have on the cost of producing it, it is clear that the leading position in the battery market can quickly take over the same position in the electric vehicle market. The high cost is mainly due to the rare and precious materials they are made of, such as cobalt, nickel and lithium itself, and is a decisive variable, considering that the battery pack can account for approximately 40% of the cost of a vehicle.

Chinese companies have developed battery technology more than anyone else over the past ten years. More specifically, they have focused on lithium iron phosphate batteries, known as LFP technology, rather than lithium nickel and cobalt magnesium, or NMC, batteries, which were more widely used by Western manufacturers due to the initially low energy density of LFPs and the limitation represented by low temperatures. Despite their low energy density, these types of batteries boast greater safety and a not inconsiderable economic advantage. While the rest of the world turned their attention away from LFP technology, Chinese battery manufacturers persevered in their development until they achieved a fair reduction in the energy density difference that limited them. Years later, today, the battery-powered vehicle industry is re-evaluating and recognising the benefits of LFP technology, a factor that has helped propel China to the top of the industry.

A further advantage available to the Chinese battery manufacturing powerhouse concerns the materials required, most of which are controlled by China itself. Beijing manufactures 77% of the world's battery cells (Europe as a whole 7%), and alone controls 58% of lithium refining, 65% of cobalt refining, and 35% of nickel refining. Although the country does not necessarily have the largest natural resources for battery materials, therefore, it has most of the world's refining capacity for critical components in this sector. A marathon on a global scale is underway when it comes to extracting the metals needed for the production of EV batteries. Who is in the

lead, as of today, is unequivocal. Compared to the western giant, the European and American car manufacturers, with the exception of Elon Musk's Tesla, are definitely struggling in the supply of materials such as lithium, cobalt and nickel. It is therefore not surprising that the big Western brands are investing billions of dollars in agreements with lithium mining companies. In fact, traditional suppliers are not enough to cover the production of all the ranges that car manufacturers have planned for the coming years, taking into account, among other things, all the government measures to limit the production of combustion-powered cars, as well as the countless incentives that are pushing and will continue to push customers in the direction of sustainable mobility. It is no coincidence that most major car companies have already expressed their intention to sell only full-electric cars in the near future.

Lithium is more than essential, and if they do not play their cards right, US and European car manufacturers may not be able to build batteries for future electric vehicles. A large part of the lithium deposits are located in South American countries such as Chile, Argentina and Bolivia, countries that not only have nationalised natural resources, but have also imposed strict controls on currency exchanges, which could hinder any investors from taking the money needed to complete their investments from these nations. One risk that car manufacturers face is the value of lithium, which has soared as a result of huge investments, but which could at the same time collapse due to intensive production on a global scale, causing car manufacturers to lose billions.

| Classifica | Paese | Capacità di produzione di celle per batterie (2022) in GWh | % del totale |
|---|---|---|---|
| #1 | Cina | 893 | 77% |
| #2 | Polonia | 73 | 6% |
| #3 | Stati Uniti | 70 | 6% |
| #4 | Ungheria | 38 | 3% |
| #5 | Germania | 31 | 3% |
| #6 | Svezia | 16 | 1% |
| #7 | Corea del Sud | 15 | 1% |
| #8 | Giappone | 12 | 1% |
| #9 | Francia | 6 | 1% |
| #10 | India | 3 | 0,2% |
| | Altri | 7 | 1% |
| | Totale | 1163 | 100% |

Dati 2022 (Fonte: *The Visual Capitalist*)

| Classifica | Paese | Capacità di produzione di celle per batterie (previsioni per il 2027) in GWh | % del totale |
|---|---|---|---|
| #1 | Cina | 6197 | 69% |
| #2 | Stati Uniti | 908 | 10% |
| #3 | Germania | 503 | 6% |
| #4 | Ungheria | 194 | 2% |
| #5 | Svezia | 135 | 2% |
| #6 | Polonia | 112 | 1% |
| #7 | Canada | 106 | 1% |
| #8 | Spagna | 98 | 1% |
| #9 | Francia | 89 | 1% |
| #10 | Messico | 80 | 1% |
| | Altri | 523 | 6% |
| | Totale | 8945 | 100% |

Previsioni 2027 (Fonte: *The Visual Capitalist*)

Under these circumstances, it is not surprising that the market places a lot of emphasis on scientific research into alternative technologies that can replace the lithium battery. One notable alternative is sodium batteries. Sodium is a metal, with an important distinguishing feature, abundance. It is also extremely cheaper than lithium, despite the chemical similarity, which makes this type of battery cheaper and capable of delivering a similar amount of energy. The sore point concerns the density, which is currently similar to that of lithium batteries of around 10 years ago, but according to the most reliable forecasts, this is an issue that can be resolved in a

not excessively long timeframe, which is nevertheless an extremely attractive alternative for Western car manufacturers given the cost and the current situation regarding the scarcity of lithium and China's dominance over it. In spite of this, the scenario of the West's emancipation from the Chinese power in the battery market, and therefore of electric cars, is not one of possibility. Everything suggests, in fact, that even in the case of sodium batteries, leadership will be in Chinese hands. There are currently more than 100 gigawatt hours of sodium-ion battery capacity planned for 2030, distributed in a total of 28 plants, most of them in China[21] . Scientific efforts are led by the Central South University, in the city of Changsha, while manufacturing efforts are led by the giant Catl, the largest company in the field of battery production for electric cars[22] . Nevertheless, one impediment that could jeopardise China's plans exists, namely the supply of raw material. Sodium, as mentioned, is abundant, but about 90 per cent of sodium carbon resources are in the US soil, in Wyoming. The problem is mainly the relationship between the US and China, which is unlikely to be in a position to rely on its biggest rival in the economic field. The alternative available is the use of synthetic soda ash, which is, however, produced in chemical plants that are often coal-fired and can therefore hardly be regarded as a clean technology. So far, with conditions in their favour, as in this case, the Chinese have managed to pull things off even with some difficulty, and the likelihood of established leadership in the field of sodium batteries does not seem at all unlikely.

In addition to the lithium advantage, China boasts the title of the largest global producer of natural graphite, with 61% of total production, and processed for the production of battery components, with an overwhelming 98%. More than half of the reserves of this mineral are reserved for the production of batteries to power electric cars. The origin of the Western countries' concerns on this matter lies in the fact that the Inflaction Reduction Act and the plan announced by the Chinese

[21] Marco Dell'Aguzzo; "La cina vuole dominare le batterie alternative del futuro" 10/06/2023 https://www.wired.it/article/batterie-cina-sodio-litio/#:~:text=Il%20dominio%20della%20Cina%2C%20di%20nuovo,-C'%C3%A8%20poi&text=Pechino%20fabbrica%20il%2077%20per,cento%20di%20quella%20di%20nichel.

[22] New York Times: https://www.nytimes.com/2023/04/12/business/china-sodium-batteries.html

government incentivise domestic car manufacturers to hoard large quantities of graphite, thus decreasing exports and restricting other car manufacturers.

China's is a decidedly intrusive presence in the electric car market, and in the face of the transition to electric and government directives to stop the production of petrol and diesel engines, extreme care is needed when making decisions in order to avoid falling hostage to a very limiting leadership.

Compared to Western groups, China's car manufacturers have an extremely significant advantage. They are almost always directly supported by the state, and in some cases even owned by it. This condition allows Chinese manufacturers to take greater risks in their investments in the mining sector, on the strength of the huge economic resources at their disposal and an already established leadership.

California, notoriously at the forefront of environmental policies, was the first of the US states to propose a ban on endothermic cars by 2035, followed by Massachusetts. A recent report also stated that this will be possible throughout the US. Battery prices have fallen more than expected, by as much as 74% since 2014, a decrease that logically runs parallel to that of electric cars. An excellence on the American continent, which increases the weight on the shoulders of manufacturers on the old continent, is the case of Tesla. Elon Musk's colossus, in fact, over the years has been able to build up an extremely efficient supply chain for lithium and other necessary materials, and has thus managed to gain discrete market shares in the U.S., China and Europe. Tesla recently made a deal with the Australian mining company Piedmont Lithium, which supplies much of the production from a huge deposit in Quebec. The other US car manufacturers, despite not having Tesla's developed supply channels, are not sitting on their hands. General Motors in 2022 made a deal with the Philadelphia-based mining company Livent, which supplies metals from South America, and in early 2023 a further $650 million investment in Nevada-based Lithium Americas to develop the Thacker Pass mine in Nevada. Ford also entered into functional agreements with three different mining companies: Chilean supplier SQM, Albamarle (North Carolina) and Nemaska Lithium in Quebec.

EV car sales are also growing strongly in the US, where a +49% was recorded in 2022, compared to +113% in China.

The supply of raw materials and the production of batteries for electric vehicles in the case of Europe shows a far more serious scenario than that described for the United States, which remains, however, dangerously far from the extraordinary results achieved in China. In Europe, lithium is mined exclusively in northern Portugal, but in very limited quantities, mainly used for the production of ceramics. Although the intention is to increase production, various 'no-lithium' environmental committees are against the expansion of mines, which is why Europe currently resorts to importing from abroad. Imports come 78% from Chile, 8% from the USA and 14% from other countries. In response to this difficulty, Italy, France and Germany, through the Stellantis, Mercedes-Benz and TotalEnergies groups, have opened a gigafactory for electric batteries with the aim of counteracting Asian dominance.

The IAA, the Munich Mobility Show in September 2023, was a good opportunity to get a complete picture of the car market and public interest, a real battleground for European and Chinese carmakers. This event, for the few who had not yet realised it, made it clear that European car manufacturers face a tough challenge. At stake is not only the environment, which is undoubtedly the main issue, but also the entire European industry.
Over 40 per cent of the exhibitors in Munich were Asian. Europe, if it wants to curb the Chinese advance, will have to succeed in producing at much lower costs than at present, more in line with the needs of the average consumer, considering that by 2035 not only the average consumer, but every consumer will have to turn to the electric market. Chinese manufacturers such as BYD, Nio and Xpeng, are just some of those who are aspiring to invade the European market on the strength of the effectiveness of their products. A chilling statistic is that of the growth in sales of these manufacturers in European countries during the first half of 2023: an increase of 55%, totalling around 820,000 vehicles, which alone account for 13% of the entire market in Europe.[23] The car manufacturers in question are already able to offer

[23] Lifegate: https://www.lifegate.it/mobilita-elettrica-europa-avanzata-cinese

customers vehicles at extremely competitive prices of around EUR 20,000. According to data gathered at the Munich show, we will see a major expansion of these models in European markets in 2024. According to Inovev, an automotive consultancy, 8 per cent of the new electric vehicles sold in Europe during the year were produced by Chinese brands, an increase of 2 per cent over the previous year's figure, which in turn was 2 per cent higher than the year before. It is clear at this point that creating a stable supply chain is not enough to be competitive in the market. Hidegard Mueller, president of the German Automotive Industry Association (VDA) stated that 'We are losing competitiveness in Germany' and added that 'the Munich motor show showed how the strong pressure of international competition makes it essential for Germany to invest more in electrification'. When reading this statement, one has to take into account Germany's leading position with the Volkswagen Group, which gives an idea of how much countries like Italy, Spain or France are struggling. An analysis of prices carried out by Jato Dynamics puts into numbers the competitive advantage brought about by years of research and development, the highly efficient supply chain and abundant state incentives, which have put this player in the position of being able to offer electric vehicles at an average cost of 32 thousand euros, a very low figure when compared to the European average of 56 thousand euros.

In line with Hidegard Mueller's opinion is the statement by Oliver Zipse, Ceo of Bmw, that "the basic car market segment will disappear or will not be made by European manufacturers," referring to the advance of Chinese power in European markets. There are those who, faced with such dominance in the sector, have chosen not to use their full resources in a battle from which it would be complicated to come out a winner, and have decided instead to ally themselves.This is the case with Volkswagen, which recently announced its partnership with China to achieve the goal of reducing production costs, by as much as 50 percent

# Conclusions

Our planet is in trouble, its cry for help is loud, and governments around the world are taking note, pledging to undo the damage wrought by the lack of behavioral ethics that has characterized our habits for too long. We are being called upon to change our consumption patterns by verging on sustainability, an area in which the European Union has always shown itself to be at the forefront. This radical change can only shake things up, disrupting entire markets and industries. Faced with the dizzying rise of Chinese power in the field of sustainable development, the European Parliament's ratification regarding the stop of internal combustion car production by 2035 is likely to put European automakers' backs against the wall, as they face a huge demand starting from a position in the market of strong disadvantage in terms of material supply, production costs and investment security. The EU's choice is very clear, the health of the planet first. Although there is no doubt about the importance of the decision taken, the international dynamics highlight the improbability of a flowery future for the automotive industry in European countries, which risk witnessing the waning of a more than century-long history of excellence and sophistication recognized around the world, the crisis of an incredibly large sector and the economic difficulties this may entail. Only the passage of time will determine the fate of the European automotive industry in this transition and, more importantly, the fate of our planet.

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